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A CAHNERS PUBLICATION

Electronic Business

FOR THE MANAGEMENT TEAM IN ELECTRONICS, COMPUTER, AND SYSTEMS COMPANIES WORLDWIDE

FEBRUARY 10, 1992

What's *really* inside Japanese annual reports

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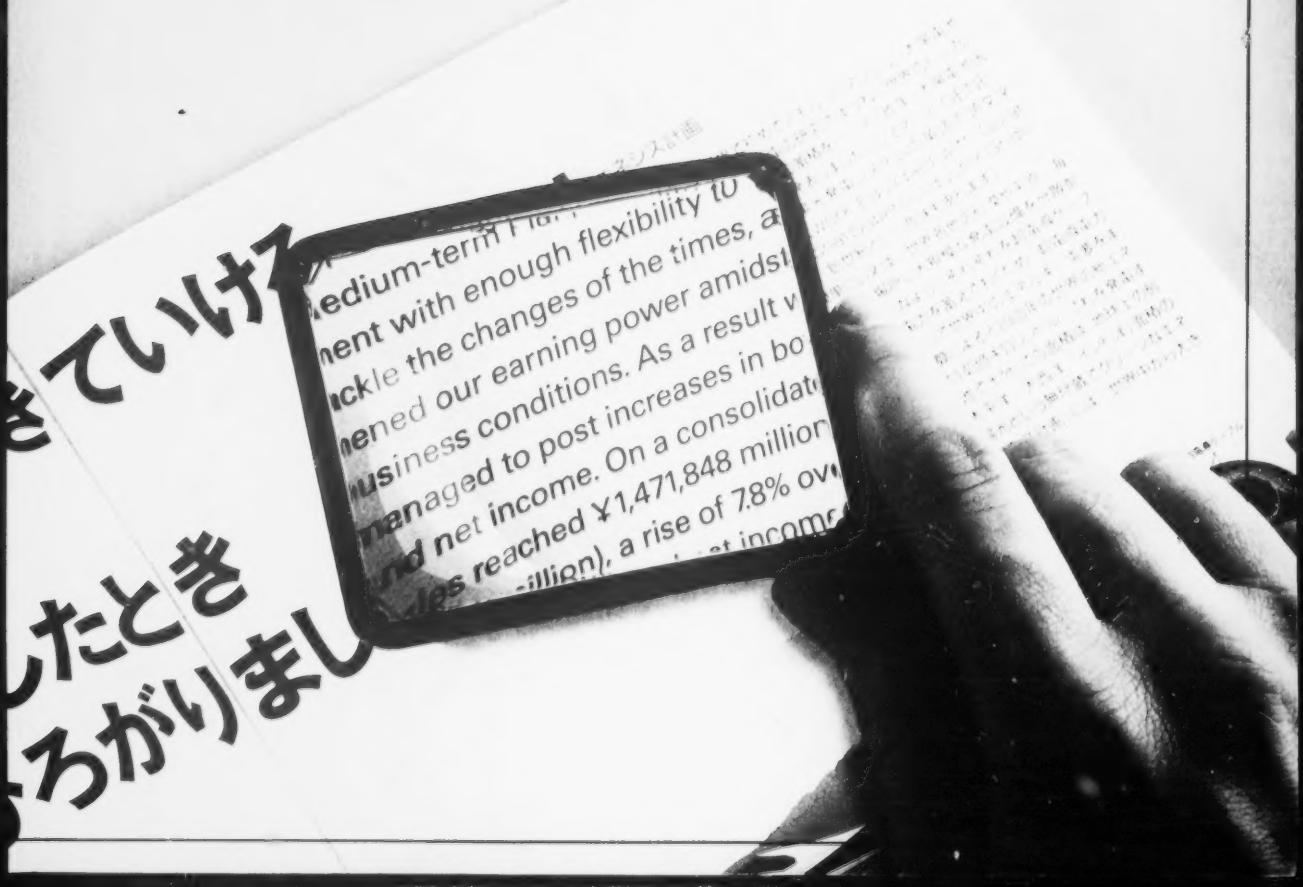
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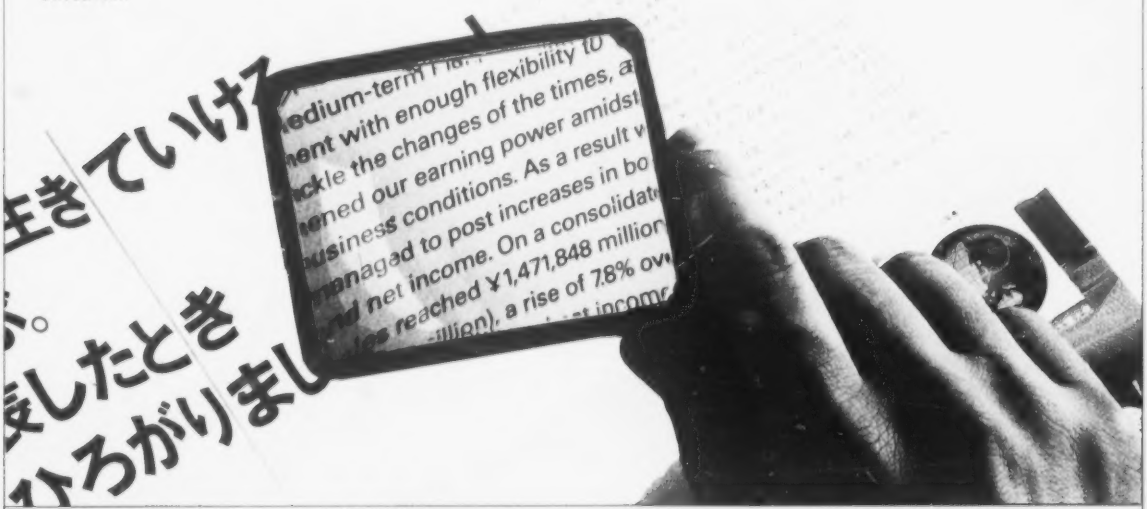

Cover photo by Dave Bradley

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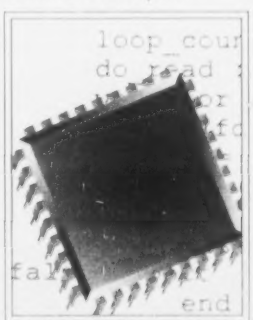

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Reading between the lines of Japan's annual reports

THINGS ARE NOT always what they seem to be in the tricky world of corporate accounting, which poses a problem when you're trying to assess your competitors' performance. That's why ELECTRONIC BUSINESS asked veteran Tokyo correspondent Paula Doe to take our readers beyond the glossy English-language annual reports of Japanese companies for a look at how Japan's leading electronics companies measure their own success.

Contributing editor Paula Doe

While certain accounting categories appear similar in U.S. and Japanese financial reports, their meanings are far different because the fundamental concepts of organization, taxation, and ownership are so different in the two countries. This is an important lesson for U.S. electronics executives struggling to understand why, for example, an immensely successful Japanese conglomerate shows a return on investment of only 4% and why its research and development spending as a percentage of revenue looks insignificant when compared with its U.S. competitor.

Japan isn't the only economic power with financial practices that confound the U.S. executive. In a global marketplace, however, demand for standards will arise sooner or later. In a companion story, senior editor Linda Stallmann explains how 70 nation-members of the International Accounting Standards Committee are working to set guidelines for cross-border investments. One important challenge for the committee is to standardize the way R&D costs are applied to annual earnings.

If you're wondering where to put your company's R&D dollars, we've picked three especially promising technologies of the '90s: sensors, wireless voice and data communication, and—perhaps the most revolutionary in terms of its implications—top-down design. Engineers are finding that, by using advanced hardware-definition languages and simulation tools, they can focus on functionality and let the software handle the design specifications.

The complete switch over to top-down design won't come overnight: System costs must come down, functional models must be made widely available, new analog circuitry must be developed, and programming bottlenecks must be loosened. You can be sure, however, that current users' claims of 100% jumps in productivity can't—and certainly won't—be ignored. □

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platform viable well into the future.

It also helps lay the groundwork that Intel needs to migrate its 80x86 platforms into the inevitable prevalence of at least two non-DOS desktop system software environments. "Intel owns the DOS [hardware] market, but where is DOS going to be in two to three years when OS/2, Windows NT, and Unix take over the desktop?" says Dave Hudson of the Standish Group. "Intel wants to ensure applications on new operating systems will run on the Intel platform."

Unisys already markets DOS desktop systems built around Intel 80x86 MPUs, and the announcement appears to be a reaffirmation of past cooperation between the two companies. Under the new agreement, Unisys will build all of its hardware, right up to its largest mainframes, around Intel 80x86 MPUs. Such a strategy frees Unisys from dependence upon money-losing proprietary systems, such as its Pyramid line of computers, which often cost more and take longer to develop.

The agreement also calls for co-development efforts to optimize future generation 80x86 MPUs for Unisys systems that will handle Unix System V, Release 4 (SVR4) applications. SVR4 is the next Unix standard.

—David Webb in San Jose

TECHNOLOGY

Can "floptical" bring vitality back to U.S. disk drives?

A 3-YEAR-OLD San Jose start-up is hoping its technology will revitalize the floppy disk drive market—a sluggish business now dominated by Asian players.

Insite Peripherals is gearing up to deliver high volumes of a long-touted high-density 20 megabyte 3.5-inch "floptical" floppy disk drive. Encased in a standard 3.5-inch floppy disk cartridge, a floptical disk holds up to 20 Mybtes of data, 13 times the amount on standard 1.44-Mbyte

Floptical capacities could reach 160 Mbytes, says Insite's Chuck Moran

floppies. The optical portion of the drive is actually a highly accurate laser servo that tells the drive where the data is. In all other respects, it is a magnetic, albeit very high density, floppy drive.

Insite has a licensed second-source manufacturer, Iomega Corp. in Roy, Utah, and has the backing of U.S. storage industry heavyweights 3M Corp. and Maxell Corp. of America, both of which will produce 20-Mbyte floptical disks that look and feel like conventional 3.5-inch floppies.

Vendors Toshiba, Teac, and Sony currently dominate the $2.3 billion worldwide floppy drive market, but they have failed to create progressively higher-capacity drives and media. The latest generation 2.88-Mbyte (formatted capacity) drive is reportedly having formatting problems and is being shunned by IBM and a slew of others. That's leaving a demand hole for 20-Mbyte and higher capacity drives from Insite and Iomega. According to Insite vice president of marketing and sales Chuck Moran, floptical technology allows for migrations to capacities reaching 160 Mbytes.

Floptical drives aren't the only 20-Mbyte capacity floppy drives currently available, however. Brier Technology Inc. in Norcross, Ga., is shipping 21.4-Mbyte (unformatted) drives using Archive Corp.'s Irwin Magnetics subsidiary as a second-source supplier. National Computer Ltd. of Japan is also licensed to manufacture Brier's drives. So far, Brier hasn't seemed to win as much industry acceptance as Insite's floptical technology.

—David Webb in San Jose

ECONOMICS

What's bigger than Greece but smaller than Thailand?

THE ANSWER IS the 34th biggest economic unit in the world: the United Republic of IBM.

The IBMs of the world increasingly are outpacing countries as growing economic units. The top 100 economies—"economy" being defined as a unit based on production, distribution, and consumption of

A sample from the "Top 100 Economies"

Rankings based on countries' 1990 GNP and companies' sales ($ billions)

33. Thailand	$64.44
35. IBM	**63.44**
36. Toyota Motor	60.44
36. Hong Kong	59.20
37. Yugoslavia	59.08
38. General Electric	**55.26**
39. Greece	53.63
40. Algeria	53.12
41. Mobil	50.98
42. Hitachi	**50.89**

Other electronics/electrical companies on the 'Top 100 Economies' list

48. Matsushita Electric	$43.09
49. Samsung	35.19
64. Siemens	32.66
68. Toshiba	29.47
77. Philips	26.99
79. BASF	25.32
80. NEC	24.60
86. Bayer	23.02
93. Mitsubishi Electric	21.21
100. Daewoo	19.98

Source: The Conference Board

goods and services—include 53 nations with the U.S., Japan, and Germany at the top. It also includes 47 industrial companies. That's eight more companies on the top 100 economies list than 10 years ago.

Finland and Denmark, the 21st and 22nd largest economies, for example, are sandwiched between General Motors (20) and Ford (23). Eighteen car and oil companies number among the top 100 economies. Electronics/electrical conglomerates captured 11 top spots (see table).

—E. B. Baatz

TEST EQUIPMENT

Teradyne's bid to crack Japan's memory test market

THE EMERGENCE OF widely differing pinout configurations on high-density memory chips may help pry open the Japanese market for U.S. manufacturers of ATE. At least that's what Boston-based ATE maker Teradyne Inc. hopes.

Here's the rationale: Memory makers, now centered in Japan, are exploiting the increased capacity of 4-megabit, and soon 16-Mbit, DRAMs and other memory devices by offering a greater choice of pinout arrangements. While this should give customers more flexibility in how they use memory, existing memory testers are still designed to test one configuration at a time.

Teradyne is responding to this market fragmentation with a new tester, the J990, introduced this month, which can theoretically test up to 64 different device types at once. Rather than existing "shared-resource" ATE architectures, the J990 features a "tester-per-site" architecture—comparable to having 64 mini-testers in one box.

Japanese machines can also test 64 devices at once, but they don't offer the flexibility that will be required for the number and complexity of memory configurations coming to market, says Ed Rogas, VP and general manager of Teradyne's semiconductor test division.

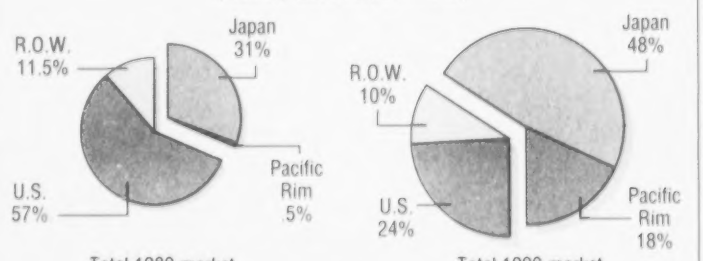
If the Teradyne approach catches on, competitors are certain to follow. That's what happened in the VLSI test marketplace, where U.S. vendors have regained the high ground with "tester-per-pin" machines that make it easier to test complex logic chips.

Like most U.S. makers of ATE, Teradyne lost out when most of the world's memory IC production shifted from the U.S. to the Far East. It has maintained a 5% share in Japan's roughly $200 million market since then, and Rogas says the company hopes to grab 30%. That won't be easy. Japanese vendors currently have 66% of the Japanese market, and their relationship with large IC makers and users remains close.

—Peter Burrows

Memory test's eastward exodus

(Memory test sales, $ millions)



Source: Prime Data

ENVIRONMENT

Water-based systems to clean up factory automation

WHEN 74 NATIONS agreed in 1990 to stop using ozone-eating chlorofluorocarbons (CFCs), the $30 million capital equipment market for CFC-based circuit board cleaning ovens evaporated faster than a puddle of freon on a summer day. On the flip side, the Montreal Protocol prompted the market for water-based cleaning ovens to start swelling.

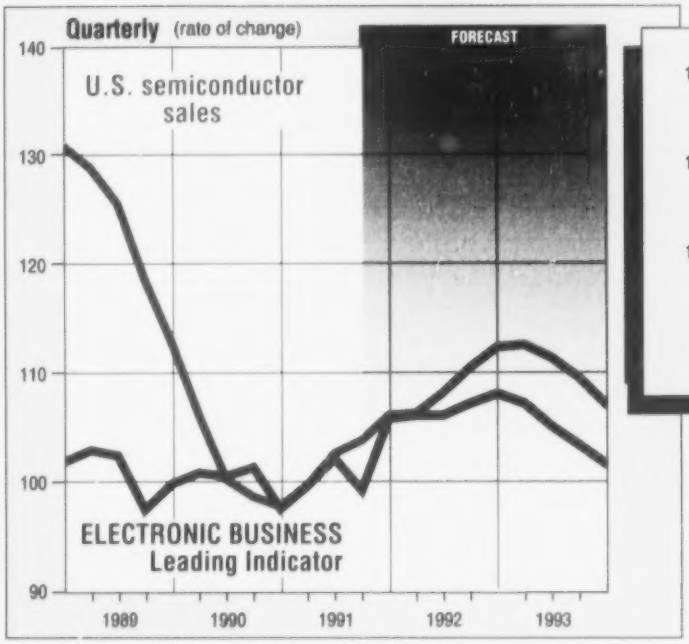
A case in point is Hollis Automation in Nashua, N.H., which has shipped more than 50 of its $25,000-to-$100,000 aqueous cleaners, making it the third-largest vendor of water-based cleaners, says Robert Schreitmueller, Hollis's marketing manager. The top two vendors are Westek in Arcadia, Calif., and Electrovert in Arlington, Tex. "It's an easy buy to justify."

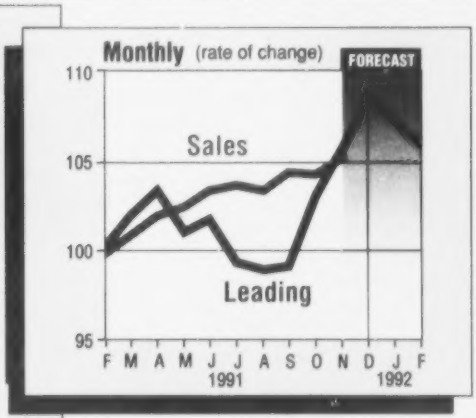
Board users' bottom lines are also benefiting. For example, Eltech Systems of Fairport Harbor, Ohio, a manufacturer of factory automation equipment, has reduced its monthly cleaning costs from $15,000 to $1,500 since it bought an aqueous cleaner from Hollis, according to Schreitmueller. Large users have even more to gain. "We have customers that were losing $50,000 to $100,000 in evaporating solvent that they never even used," says Steve Randolph, product marketing manager with Accel, another aqueous cleaner vendor in Plano, Tex.

Many observers thought that semi-aqueous cleaners—not full-aguenous cleaners—would become the new standard because their similarities to CFC-based systems often allowed them to be drop-in solutions. That changed when chemical giants DuPont and Allied-Signal announced that they were scrapping development of CFC alternatives because of their high toxicity. Also, many of the alternatives do not clean as thoroughly as CFCs do, and products are often washed in water anyway.

—Peter Burrows

ELECTRONIC BUSINESS Leading Indicator



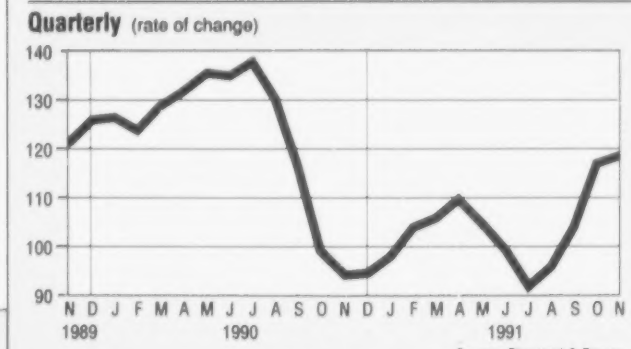


Indicator surges way up in November

THE ELECTRONIC BUSINESS Leading Indicator (EBLI) surged again in November to an unexpected high of 105.7, up from 103 in October and at its highest level in three years. Two statistics contributed the most to the boom: Buyers have reported sharply extended lead times for components, and semiconductor company stock prices have soared. A solid increase in semiconductor bookings and longer work days for production workers also confirm the trend. Components inventory and contracts for new plants and equipment are the only statistics that are not indicating a turnaround yet.

—John Farrell

Semiconductor stock prices head up in late '91



Source: Standard & Poor's

	Latest month	Previous month	Year ago	1990 average
ELECTRONIC BUSINESS Leading Indicator (rate of change, Nov.)	105.7	103.0	97.3	99.9
U.S. semiconductor bookings ($ millions, 3-month average, Nov.)	$1,325	$1,253	$1,153	$1,254
Weekly hours of semiconductor production workers (monthly average, Oct.)	41.5	41.6	40.0	40.4
Electronic components lead time index (1977 = 100, Dec.)	87.4	88.7	67.2	80.7
S&P's semiconductor stock price index (1970 =10, monthly average, Nov.)	64.3	63.4	54.9	64.6
Change in electronic components inventories ($ millions, SA, Oct.)	-$58	-$81	$14	$33
Contracts and orders for plant and equipment ($ billions, SA, Oct.)	$34.9	$32.9	$42.1	$38.6

SA = seasonally adjusted; all other data are not seasonally adjusted

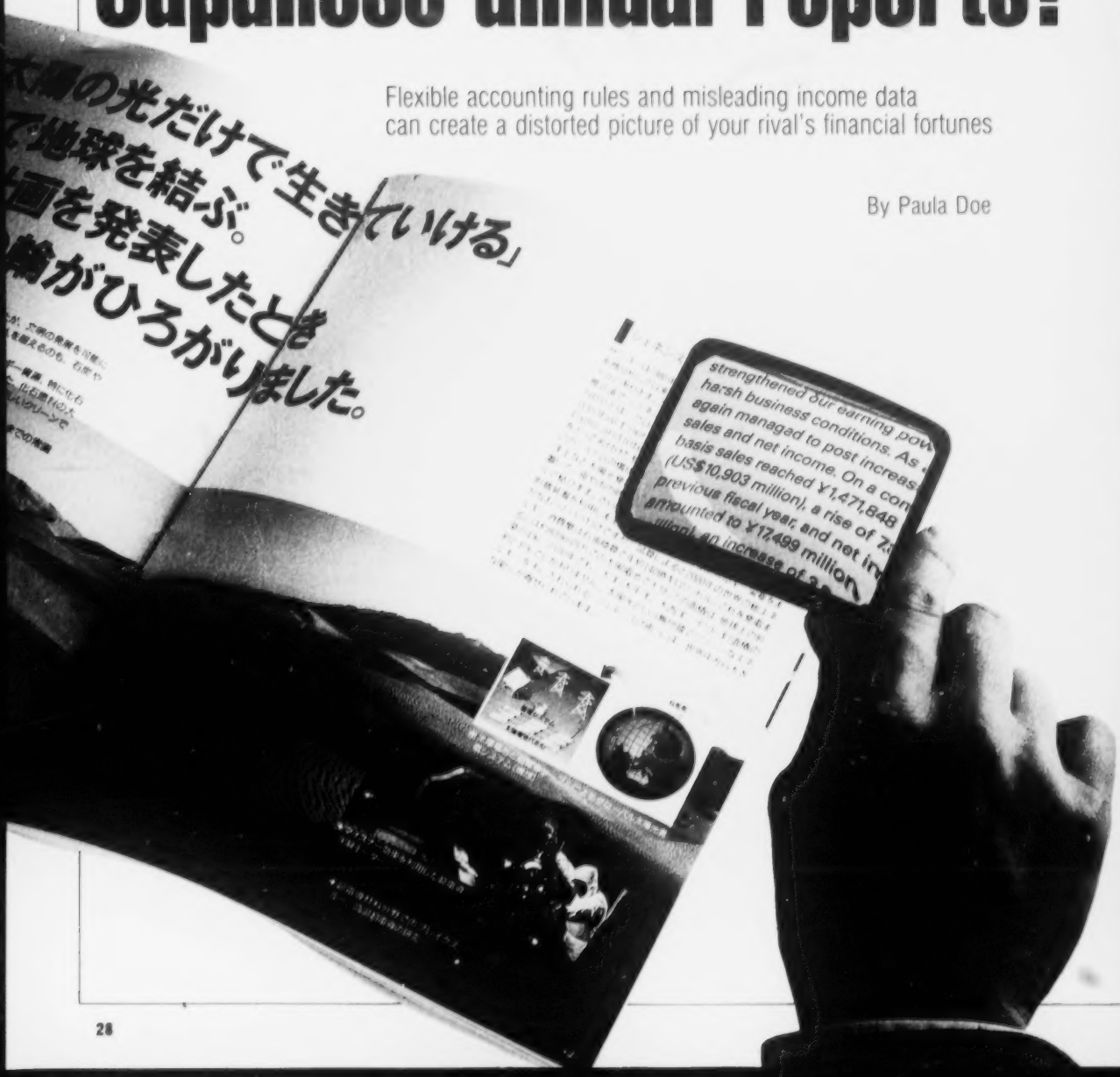
Sources: Semiconductor Industry Association, Bureau of Labor Statistics, *Electronics Purchasing* magazine, Standard & Poor's, Commerce Dept., Bureau of Economic Analysis, Cahners Economics

EBLI is a weighted composite of six statistics that lead activity in the electronics industry. To obtain a complimentary background paper, contact Cahners Economics, 275 Washington St., Newton, MA 02158-1630, USA; telephone (617) 630-2119; fax (617) 630-2100

What's buried inside Japanese annual reports?

Flexible accounting rules and misleading income data can create a distorted picture of your rival's financial fortunes

By Paula Doe


strengthened our earning pow
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(US$10,903 million), a rise of 7
previous fiscal year, and net in
amounted to ¥17,499 million

If you've ever tried to compare your company's performance and costs with those of your Japanese competitors by looking at the English version of their financial reports, you've probably found some numbers that seem wildly out of whack with reality. Well, they probably are. Measuring your company's financial data against that of its Japanese counterpart, in fact, is a classic case of comparing apples with oranges.

The reason is that, while those glossy English-language reports from Japanese companies may look just like U.S. annual reports, the data are not put together with anything close to the same consistency as found in U.S. financial statements. Although Japanese accounting rules, themselves, differ only slightly from U.S. rules, they are applied with a mind-boggling flexibility. The best approach is to be suspicious of all numbers in the English versions.

A Japanese corporation's financial performance usually looks dismal using financial benchmarks such as profit margin or return on investment. The 10 largest Japanese electronics companies in the ELECTRONIC BUSINESS International 100 typically reported an ROI of around 4%, while the largest U.S. companies achieved a 5.9% level in 1990. But don't cry for Sony, Fujitsu, and NEC—they aren't really doing so badly.

The facts behind the Japanese figures

- Flexible rules preclude direct comparisons
- Productivity indicators exclude key subsidiaries
- Net income understated due to high tax rate
- More aggressive depreciation than in U.S.
- Entertainment and employee perks not deducted
- R&D spending somewhat inflated

Source: ELECTRONIC BUSINESS

The returns look low because of Japan's different corporate structure, aggressive depreciation schedules, high taxes, and the nature of Japanese business culture. It may sound strange at first, but the Japanese financial system doesn't demand high profits. The Japanese aversion to public confrontations, combined with the long-term interlocking stock holdings among the major companies, their suppliers, and their bankers, prevents shareholder revolt over what would appear to be poor performance. "One-third of a company's stock is apt to be held by its banks, and another third by its suppliers and customers," notes Alvin Pederson, a partner at Arthur Andersen & Co.'s office in Tokyo. "The companies cater to the stable stockholders." The system does require a return on sales of about 2% to 3% to keep the bankers off management's backs, so that's what many companies produce.

Just because the net income numbers may seem low from an ROI and margin standpoint, don't assume that profits are low. Japanese reports understate profits because of a high tax rate and rapid depreciation. "Japanese financial statements are more conservative, leaning toward understating income," explains Andersen's Pederson. Adds Richard Stolz, partner at Chuo Shinko Audit Corporation/Coopers & Lybrand in Tokyo, "Japanese statutory rates are 51.5%, and Japanese companies have lots of non-deductible expenses, so their tax rates are higher than statutory." The U.S. statutory rate is 34%. Japanese companies can't deduct entertainment expenses or employee perks—all those nights in the Ginza, golf club memberships, and executives' cars—and that adds up to a lot of yen. NEC paid about 60% of consolidated pre-tax income in taxes in the fiscal year ended March 1991, or 2% of revenues. Fujitsu paid 59%, or about 3% of revenues. In contrast, IBM's tax rate was 41%, Xerox's was 36%, and DEC's was 40%.

Large deductions for depreciation also make Japanese corporate income look low. U.S. companies use fast depreciation, which reduces earnings when calculating their taxes, but they use lower straight-line depreciation, which inflates earnings when preparing their annual reports. Japanese companies use accelerated depreciation for both. The single biggest difference between U.S. and Japanese financial reports is more aggressive depreciation, notes Steven Myers, an analyst with Jardine Fleming Securities Ltd. in Tokyo. "Japan has more liberal rules, and there is more liberal interpretation of the rules by companies."

Consider these figures: Fujitsu deducted some $1.6 billion in depreciation in the fiscal year ended March 1991, about 8% of its $21 billion sales, and more than its $1.5 billion of operating income. Overall, Japanese compa-

nies' depreciation is about 8.3% of revenue, while the top 10 U.S. electronics companies' depreciation accounted for about 6% of sales.

Much of the difference in the way U.S. and Japanese companies report financial results comes not from alternative depreciation schedules and tax rates, but from the extreme flexibility of the application of the rules in Japan.

In the U.S. there may be some minor disagreement over the definitions, but by and large, what counts as research and development—and what doesn't—is fairly clear. In Japan, it's not clear at all. Indeed, whim seems to count as much as regulations. NEC, for example, reported R&D spending of 16% of revenue for the fiscal year ended March 1990 in its English-language annual report, which has been adjusted to conform with U.S. generally accepted accounting principles. The following year, NEC reported spending only 8% of revenue on R&D, while spending 17% of sales on "R&D and engineering" combined. Why the dramatic change? It simply decided to stop including engineering work for its factories in the line item for R&D, according to company reports.

Japanese electronics profits aren't what they seem

	Top 10 Japanese companies	Top 10 U.S. companies
Profit margins (net income as % of sales)	3.1%	6.2%
Return on investment	3.8%	6.6%
Productivity (sales/employee)	$196,277	$151,675
R&D spending (% of sales)	6.2%	7.0%
Depreciation (% of sales)	8.3%	6.4%

($1=142 yen)

Source: ELECTRONIC BUSINESS

ANOTHER REASON WHY Japanese R&D spending is hard to compare with U.S. spending is the slightly different definitions of what can be included in R&D. Japanese companies can include in their R&D charges late-stage product development and even some market research expenses, which would be posted to the line items for cost-of-goods and "selling and general administrative expenses" of U.S. companies. On the other hand, Japanese companies can also capitalize new product R&D over five years, while U.S. companies expense R&D costs in the year they're incurred. Another Japanese quirk that artificially depresses R&D figures—some of the people doing R&D may come from other departments and not be charged to R&D.

The net effect of the Japanese system is probably to inflate the reported R&D spending, but not by a lot, according to analysts and auditors. It probably comes as a surprise, then, to consider that U.S. electronics companies outspend their Japanese competitors on R&D as a percentage-of-revenue measure, 7% to 6.2%, though the sheer size of Matsushita, NEC, Hitachi, Fujitsu, and the other major Japanese companies means that the absolute dollars devoted to Japanese electronics R&D dwarfs the U.S. investment (see table).

While analysts and auditors don't think Japanese companies are wildly overstating R&D spending, they advise their U.S. clients that the wide variation in R&D accounting practices makes the numbers from particular companies considerably different from what they might report if they were U.S. companies. "In Japan, there is a much smaller white area, a much smaller black area, and a whole lot more gray," explains Harold Kahn, a partner at Price Waterhouse in Tokyo. "There is much greater ability to be flexible." Also, he notes, the Japanese culture is not oriented toward junior auditors aggressively questioning senior managers at client companies.

The variability isn't a big problem in Japan, because few pay much attention to these numbers anyway. "The Japanese don't think these financial reports are very important," points out Daniel Maher, partner in Chuo/Coopers & Lybrand Consulting in Tokyo. "You should take them in the spirit in which they are prepared."

Not only do officials of Japanese companies generally ignore the stock market, they don't use complex financial information much themselves either. "Cost accounting doesn't exist," says Maher. "There are more accountants in Missouri than in all of Japan." In fact, there are only about 11,000 certified public accountants in Japan, compared with some 300,000 in the U.S. Instead of corporate accounting departments or professional accountants, most Japanese companies have small accounting groups attached to projects and staffed by generalists who rotated through

accounting between assignments to, say, personnel and sales.

All of this laissez-faire approach to corporate finance is changing, though. Japanese companies are moving toward more sophisticated analysis and beginning to take an interest in the concept of measuring shareholder value, notes Kevin Jones, a principal at McKinsey & Co.'s Tokyo office. And notice how NEC's most recent financial statements conformed to U.S. standards.

Besides unusually flexible accounting, the other major problem with Japanese financial reports is figuring out just what part of the company's business is actually included.

The official report in Japan contains data for the parent company alone. Unfortunately, these are the numbers that show up in most of the electronic data bases and corporate directories from Japan, and even in a surprising number of companies' glossy English-language annual reports. Parent-only numbers are likely to leave out manufacturing plants and sales units organized as separate subsidiaries, and thus not report a significant portion of the company's costs, assets, and people.

Figures purporting to reveal the average sales per employee for Japanese companies, $196,277 in 1990, are a sham. The lack of consolidation of subsidiaries and affiliates offers top managers boundless opportunities for unreported transfers to and from subsidiaries.

Some Japanese electronics companies have consolidated reports, but these, too, have gaps. Under Japanese accounting rules, majority-owned subsidiaries don't have to be included if they comprise less than 10% of assets. Consolidated reports from Japanese companies that are based on U.S. accounting rules offer the best picture, although these reports won't provide the type of data necessary to make a clear and fair comparison: Frequently the rest of the corporate family of affiliated subcontractors remains outside these consolidated reports. By only including part of the production process on the books, Japanese costs look misleadingly low, and productivity looks misleadingly high.

"Japanese reliance upon subcontractors is much greater, so U.S. costs look higher," says Price Waterhouse's Kahn. "It's hard to tell how many similar costs are being

How the financials of top U.S. and Japanese companies compare

	Total sales ($ millions)	Electronics sales ($ millions)	Net income ($ millions)	Net income (% sales)	Return on investment	Sales per employee	R&D % of sales	Depreciation % of sales	Fiscal year ended
Japan									
Matsushita	$46,708	$33,320	$1,833	3.9%	4.2%	$221,522	5.8%	4.1%	3/91
NEC	26,179	26,179	385	1.5	2.4	221,865	7.6	6.3	3/91
Toshiba	33,232	25,048	855	2.6	4.1	205,138	6.4	5.5	3/91
Hitachi	54,759	22,853	1,629	3.0	5.0	176,782	6.3	5.8	3/91
Fujitsu	21,031	21,031	585	2.8	3.4	144,174	11.1	7.6	3/91
Sony	25,596	20,419	828	3.2	3.9	226,718	5.7	5.9	3/91
NTT	44,246	14,969	1,848	4.2	3.0	167,025	4.4	24.0	3/91
Mitsubishi	23,471	11,776	565	2.4	3.6	242,002	4.8	5.2	3/91
Canon	11,932	11,683	424	3.6	4.9	219,409	5.0	4.7	12/90
Sharp	10,847	9,000	332	3.1	3.3	296,852	5.9	5.8	3/91
United States									
IBM	$69,018	$69,018	$6,020	8.7%	9.7%	$184,631	9.5%	7.7%	12/90
AT&T	37,285	16,832	2,735	7.3	13.4	136,226	6.5	9.1	12/90
Xerox	13,583	13,583	599	4.4	3.6	137,202	6.2	5.1	12/90
Hewlett-Packard	13,233	13,233	739	5.6	8.8	143,837	10.3	4.3	10/90
Digital Equipment	12,943	12,943	74	0.6	0.9	104,375	12.5	6.2	6/90
GM Hughes	11,723	11,723	577	4.9	6.4	122,116	4.8	4.2	12/90
Motorola	10,885	10,885	499	4.6	8.3	103,667	9.3	7.3	12/90
Unisys	10,111	10,111	-437	-4.3	-6.1	134,280	7.4	5.2	12/90
General Electric	58,414	9,430	4,303	7.4	5.0	196,020	2.5	4.3	12/90
Texas Instruments	6,567	6,567	-39	-0.6	-1.3	93,390	8.2	8.2	12/90

Source: ELECTRONIC BUSINESS

International accounting standards evolving

THE DIFFERENCES among various countries' accounting standards may eventually disappear. Pressure from the international business community for truly comparable financial statements, which would encourage more cross-border investing, is expected to lead to more uniform international accounting rules by mid-decade. While major obstacles such as national corporate and tax laws are not easily hurdled, some modifications may be implemented as early as next year.

After almost 20 years of deliberations, the 70 member countries represented on the International Accounting Standards Committee (IASC) have developed 31 rules governing public securities. The IASC recently accelerated its efforts to reduce the high number of acceptable alternative approaches to accounting topics, such as the choice of LIFO or FIFO inventory valuation offered under U.S. accounting rules. The goal of the IASC is to eliminate the 30 or so topics that include acceptable alternatives. Approximately 23 of the less contentious differences are expected to be resolved by next year, leaving about six "of the tough ones to be resolved by mid-decade," says Arthur Wyatt, a senior partner with the Chicago accounting firm of Arthur Andersen & Co. and chairman of the IASC.

Several issues currently under review include subjects of special importance to the electronics industry. Resolution of different approaches to revenue recognition, accounting for the impact of changes in foreign exchange rates, and the charging of research and development activities will have a significant impact on corporate reports.

For example, the current draft on R&D proposes that development costs that meet certain specified criteria should be recognized as an *asset* and, therefore, are eligible for depreciation. Capitalizing certain development costs over a period of years instead of expensing them would come as welcome news to U.S. companies, because the shift would increase reportable earnings. Development costs that do not meet these criteria and all research costs would be recognized as expenses as incurred.

—Linda Stallmann

pushed off on the subcontractor."

Subcontractors can make companies look incredibly productive, as well. Andersen's Pederson points out how Toyota Motor Corp.'s much-touted productivity (relative to U.S. auto makers) is really largely due to subcontractors doing much of the work—Toyota does only final assembly in its own plants.

Is it impossible to develop realistic performance comparisons? Better information is available in the more detailed Japanese language reports filed annually with the Ministry of Finance. These reports are flawed—most of the details are for the parent company only—but they do have a wealth of information. Data are available on how many researchers worked at a company's various laboratories, how much the parent company charged to its administrative expenses for R&D, and how many manufacturing costs it transferred to other accounts such as R&D. ELECTRONIC BUSINESS will present a detailed report on Japanese companies based on these reports in an upcoming issue.

Help in analyzing Japanese financial statements is also coming from the authorities. Japanese securities regulators are starting to require more detailed consolidated disclosure, although they are facing fierce resistance. In addition, an international movement to develop more uniform accounting rules is under way. Accounting firms and electronics companies will be revising their definitions of R&D, depreciation, and other financial items to more closely conform with international standards during this decade. While Japanese companies may not be the first to embrace international standards in the short term, the need to attract international investors ultimately will encourage a more consistent approach. □

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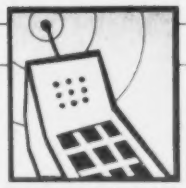
Additional research by Linda Stallmann

A detailed analysis of Japanese electronics companies' hidden financial data will be published in an upcoming issue of ELECTRONIC BUSINESS



Hot air: networks without wires

Radio frequency-based data- and voice-communication systems loom as an $11 billion U.S. market by 1995, if the FCC moves fast

By David Webb

Last year, Apple Computer Inc. in Cupertino, Calif., petitioned the Federal Communications Commission (FCC) to allocate a certain band of radio frequency for use in wireless data communications systems. Beyond stirring a few ripples in the trade press and jokes ("I want my AppleTV"), the petition's real ramifications were largely misunderstood.

Actually Apple, Oracle, Motorola, National Semiconductor, and even IBM are paving the way for one of the next important technology waves of the electronics industry: wireless data and voice communications. These companies are actively developing systems to broadcast data inside buildings and on campuses, throughout cities, and across continents by leveraging public airwaves, private and public satellite networks, and existing terrestrial cellular and microwave networks. "There is a fundamental need for both portability and ease of communications in the computer market right now," declares Gary Johnson, National Semiconductor's director of marketing and operations for its mobile communications products.

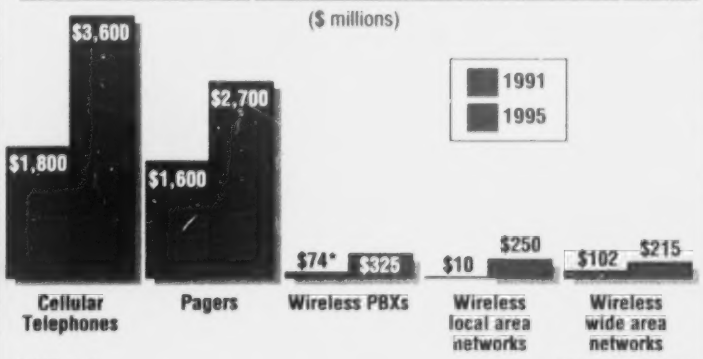
The U.S. personal and wireless communications markets will reach $11 billion in service and hardware revenues by 1995, according to Dataquest Inc. in San Jose. Add to that the European markets, perceived to be well ahead of the U.S. in frequency allocations and wide-area personal communications products, and the Asian market, which sports the highest per-capita use of cellular systems in the world, and the total worldwide wireless communications market could easily be four times the size of the U.S. market by 1995. "For a lot of people, wireless means cellular," says Stephen Hester, president of SDH & Associates, a Sunnyvale, Calif., communications research firm, "but if you start looking at the full spectrum of wireless, it turns into some potentially huge market opportunities."

Significant regulatory and market challenges currently hinder the U.S. market from realizing its potential. The FCC has to allocate precious radio spectrum and the industry has not yet agreed to protocols and other technological standards. Vendors have been able to enter some of the markets by buying spectrum access from current licensees.

Last year, vendors began to enter the wireless local-area network (LAN) market. Motorola shipped the hardware and boards for its Altair wireless LAN product line and is considered one of the leaders in the fledgling market. "This is a strategic element of Motorola's future strategy," claims Hester. Dataquest predicts that the wireless LAN market will grow in the U.S. from $10 million in 1991 to $250 million by 1995. NCR, Photonics, and BICC Communications are other early entrants shipping radio-frequency or infrared wireless LANs.

Another new form of wireless LAN actually is a misnomer—it depends on the existing electrical wiring in buildings in combination with infrared data exchangers. Small

The booming market for wireless communications gear



* 1992 data

Source: Dataquest

businesses with limited funds and data-transmission rates are the primary market for the "carrier current"-based systems—110-volt wires as the transmission medium. Using existing electric wiring offers small LAN users the convenience of wireless LAN systems—it's easy to move the PCs as their companies grow and need to move into larger spaces.

Local-area networks using cables won't be threatened with obsolescence until wireless system performance eclipses the performance of wire-based systems. It will be well after the year 2000 before cables are truly passe, due to users' need to leverage their investments in wire hardware. By mid-decade, however, users will have the option of installing wireless LANs that are competitive on a cost-of-ownership basis relative to wire-based systems.

At the wide-area network (WAN) level, Motorola and IBM created a nationwide radio-frequency data communications service called Ardis four years ago. It's a packet radio data information service with access limited to 400 U.S. metropolitan areas. Last year, Motorola announced its plan for Iridium, a 77-satellite radio network that would span the globe by 1996. In New York, Ram Mobile Systems Inc. predicts a mid-1993 launch for its wireless data communications network similar to Ardis. Two Washington, D.C., companies, Mobile Telesystems Inc. and Metropolitan Fiber Systems Inc., are building satellite packet radio systems similar to Ardis to offer WAN service, replete with their own computers. Dataquest estimates that that market will grow from $102 million in 1991 to $215 million by 1995.

Many other wireless markets are under development. Vendors are working on in-building wireless telephone switchboards (PBXs). IBM, Hewlett-Packard, Poqet Computer, and others offer notebook and handheld PCs that communicate via radio frequencies and infrared signals. "Within five or six years, nearly every notebook and handheld PC will have some sort of wireless communications capability," says Ake Persson, executive vice president of business development at Ram Mobile Systems.

Silicon will be 40% to 50% of the hardware cost of wireless personal communications systems, notes Gary Johnson, director of marketing and operations for National Semiconductor's mobile communications group

A wireless communications market for consumer products also tantalizes vendors. Personal communications networks (PCNs) would eventually eliminate conventional pay telephones, replaced by miniature cellular telephones that fit in a pocket. Dataquest estimates the U.S. PCN hardware market to grow to $5.4 billion by the end of the decade, with $6 billion in U.S. PCN service revenues. Chip vendors are especially interested in this market because of the high volumes of high value-added products. "Silicon will be 40% to 50% of the hardware cost," notes National's Johnson, "and is now driving PCNs to market."

A variety of technologies are being used in these pioneering wireless applications. Motorola's Altair system uses an 18-gigahertz narrowband frequency for data interchange between computers within a building. NCR's WaveLAN product and Telesystems' Arlan wireless network use "spread-spectrum" radio frequency transmissions, which essentially spread data over simultaneously broadcast frequencies in a coded form known only to the system's transceivers and receivers. Other wireless LAN vendors such as BICC and Photonics avoid FCC hassles by adopting infrared LAN systems available without a license.

Access to the radio spectrum for true wireless networks is tied up in a regulatory morass. The FCC has been slow to react to spectrum applications, much less approve them, since the required airwaves have already been allocated to other licensees. Lobbying from incumbents who don't want to share or relinquish their previously allotted part of the spectrum has delayed new allocations. "There's absolutely no spectrum shortage," insists Edgar Sack, chairman of Zilog Inc., a Campbell, Calif., chip maker that is closely watching the wireless market, "just poor utilization of the spectrum."

In addition, vendors, regulators, and users have to agree to technological standards that must precede development of the broadcast infrastructure required for WANs and PCNs. European regulators and vendors already have a two-year advantage in setting up their wireless standards.

The FCC has been slow to react to spectrum applications, much less approve them

However, the FCC is making progress. In early December, the commission began to consider a bandwidth allocation in the 1.8- to 2.3-GHz frequency range of the public radio spectrum for wireless networks. Vendors expect that a band somewhere within that spectrum will be approved and allocated for PCN and data communication applications. "By mid-year, the FCC will give systems manufacturers enough guidance to get them started," predicts National's Johnson. □